Salt marsh vegetation monitoring in Hatches Harbor, Cape Cod National Seashore

Background

Three salt marshes within Cape Cod National Seashore (CACO) have been impacted by tidal restrictions that impair normal seawater exchange. Such restrictions can dramatically alter the structure and functioning of salt marshes. Exotic, freshwater , and upland plant species tend to proliferate and there can be a substantial loss of marsh elevation through the deterioration of peat substrate.

Hatches Harbor is a 200-acre salt marsh that was bisected in 1930 by a dike originally built to control mosquitoes. From 1930 to 1987, tidal exchange was eliminated, which caused hydrological and biogeochemical changes that severely impacted the system. In 1996, the National Park Service, in cooperation with the Provincetown Airport Commission, Provincetown Municipal Airport and the Federal Aviation Administration, agreed to restore the degraded habitat. To accomplish this, four 7-foot wide rectangular box culverts with adjustable gates to regulate tidal flow were installed into the dike. From April 1999, these culverts were progressively opened until October 2005, at which point full tidal-exchange capacity was reached.

Vegetation Monitoring Results

A vegetation monitoring program was initiated in 1997, prior to the restoration of seawater flow, with the main objective to monitor the progress of restoration. Vegetation monitoring has been conducted roughly every 2 years since 1997. Since that time a number of important trends have emerged. Native salt marsh species such as *Salicornia maritima* and *Salicornia virginica* (pickleweed), *Spartina alterniflora* (cordgrass), and *Suaeda* species (seepweeds) have proliferated.

Phragmites australis (common reed) is an invasive, exotic plant that had become the dominant plant species in the restricted marsh prior to restoration this species has since declined in abundance (Figure 1), although the major change has been in its position (Figure 2). In this regard, *Phragmites* has migrated upslope in an easterly direction, away from regularly flooded zones. In the wake of its retreat, native salt marsh species have become abundant.

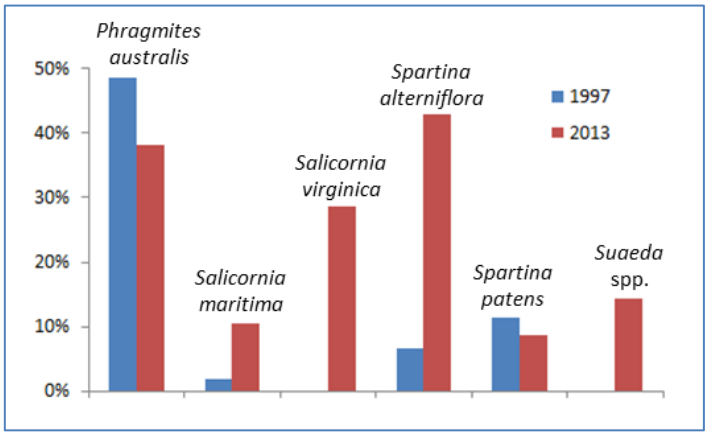

Figure 1. Frequency values (number of plots in which a species occurs out of the total number of plots) of various key plant species in Hatches Harbor in 1997 vs. 2013.

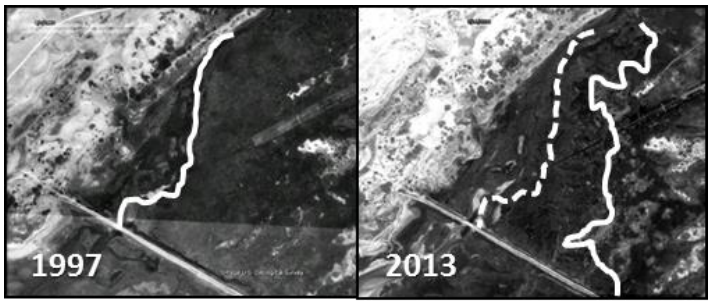

Figure 2. *Phragmites* retreat upslope since 1997.

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More Information

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Figure 3. *Spartina alterniflora* (green, foreground) replacing salt-killed Phragmites (grey) in Hatches Harbor.

Conclusions

Tidal restoration at Hatches Harbor has resulted in the recovery of approximately 60 acres of salt marsh so far. Conditions are still changing as native plant communities continue to expand throughout the marsh. This project offers proof that tidal restoration of diked marshes can be effective at bringing coastal wetlands back to life after being degraded by tidal restrictions.